

Editorial

Continuing the Tradition of Excellence: Where We Have Been and Where We Could Go

THE IEEE TRANSACTIONS ON AUTOMATIC CONTROL (TAC) continues receiving and publishing high quality papers. These papers are rigorously reviewed, revised and re-reviewed before they are accepted and published. This is a lengthy and difficult process that involves a significant amount of time and effort from reviewers and editors, and it is an emotionally difficult and sometimes frustrating task for the authors. However, this is an extremely valuable process for the authors and the profession as a whole. As a result, the overwhelming opinion is that the papers, after going through the review process and are published, are better and more carefully written than they were when originally submitted, the results have been thoroughly checked for correctness, and the presentations are clearer. So the state of the TRANSACTIONS is good.

As the Editor-in-Chief, I thought to share with you a number of relatively recent changes that have taken place in TAC. You may have noticed some of them, but you may not be aware of some others.

I. SOME OPERATIONAL DETAILS—GET TO KNOW YOUR TAC

I have now been involved with TAC for almost five years, originally as Editor-Elect, when I was in charge of the Technical Notes in 2009, and since January 2010 as Editor-in-Chief. The two offices of TAC, one office in Italy was handling exclusively Technical Notes, were consolidated into one office at the University of Notre Dame in January 2010. In early February 2010, TAC launched a new website at <http://www.nd.edu/~ieetac/>. We have been using the web-based system TACON (TRANSACTIONS ON AUTOMATIC CONTROL ON Line), developed under my predecessor, to handle the reviewing process and we have been very happy with it.

In 2009 we introduced the positions of Senior Editors, a change that has proven to be very successful. Currently we have six Senior Editors and 44 Associate Editors. The number of Associate Editors has increased from 38 in 2010, but it is still relatively low compared to competing publications. The current (2013) TRANSACTIONS Editorial Board (TEB) includes Associate and Senior Editors from 17 countries.

In the past five years we have received papers with authors from 90 different countries. The annual total number of submitted papers has been stable since 2010 at around 1,500 a year. What has changed is that while before the number of submitted Technical Notes (TN) was considerably higher than the number of submitted Full Papers (FP), in 2012 and likely in 2013, the numbers of the TN and FP are about the same.

We publish 3,240 pages a year, up from 3,000 pages in 2010. This corresponds to 270 pages per issue.

We publish about 30 papers in each issue.

We have improved the time from submission to publication—a metric IEEE, our parent organization, is very interested in. To achieve this, the TAC Editorial Office keeps close track of the reviewing cycles and alerts editors of delays; the length of the reviewing cycle depends on the reviewers and we are always on the lookout for knowledgeable and dependable colleagues who are willing to spend the time and effort to provide us with a substantial review. At TAC we are fortunate because our good reputation makes it easier for us to attract excellent reviewers. The fact remains that a complete reviewing cycle takes no less than three to four months for a decision to be sent to the authors, and a paper typically takes two full cycles of reviewing and revising before it is published. We also encourage authors to submit their revised paper as soon as possible. Currently, accepted Full Papers and Technical Notes are scheduled for publication in print five to six months later. Since IEEE requires about four to six or more weeks to prepare the manuscript for print, the actual backlog for FPs & TNs is about four to five months.

Early Access: Since January 2010, TAC has switched to the “Preprint Workflow” option at IEEE Xplore. In this workflow the full text PDF, as provided by the author, is posted to the Xplore site in the Early Access section, soon after receipt by IEEE in Piscataway, NJ. Note that the publication date in print has become less important today since the accepted papers, after they are sent to IEEE, are posted under “Early Access” within approximately one to two weeks. The publication date of the article is the date it was first posted in IEEE Xplore. This date is displayed with all versions of the article, in a footnote and in the abstract record in Xplore. When the final article appears in a printed issue, the preprint is removed from the Early Access section. This change has been very appealing to the authors and readers of TAC.

IEEE measures the number of PDF downloads of papers in Xplore. In 2012 out of 311 Periodicals, *TAC* was ranked number 15. For your information the PROCEEDINGS OF THE IEEE is ranked number 13, and *Information Theory* is ranked number 12.

Open access: Following IEEE’s lead, TAC now has an Open Access option for the authors to select, in which case the published paper will have unrestricted public access after an Open Access fee is paid. Details may be found in the submission page of TAC.

Special Issues: Two special issues have been published recently: *Wireless Sensor and Actuator Networks*, vol. 56, no. 10, October 2011; and *Control of Quantum Mechanical Systems*, vol. 57, no. 8, August 2012. There are two more special issues that will be published in the near future: *Relaxation*

Methods in Identification and Estimation Problems, and Control of Cyber-physical Systems.

iThenticate: This is the name of a software program designed to detect overlap among papers. Every paper submitted to TAC is now automatically evaluated by the system for content overlap with other submitted and published papers. If the overlap is above a certain threshold the system alerts the Senior Editor who then evaluates the case and takes appropriate action. There is increased emphasis by IEEE on detecting plagiarism and iThenticate is part of that effort. More information may be found in the article titled Ethics in Publishing, *IEEE Control Systems Magazine*, pp. 24–25, December 2012.

IEEE Five-Year Review: In 2011, TAC together with the other two Control Systems Society (CSS) publications, was reviewed. This is a periodic five-year review by the IEEE, this time covering years 2006 through 2010. We did very well, which was not surprising as TAC is highly regarded by IEEE headquarters. Interesting issues arose regarding performance measures, such as the two and five year Impact Factor, Eigenfactor, h-index, etc., metrics, which have invaded the halls of academia and publishing houses in recent years. The merits of each index can be debated for a long time, but the quick advice is that if such metrics must be used, it is more appropriate to use more than one index or as many as you can! This is sound advice and not self-serving at all as TAC ranks very high in every index.

Editorial Ethics: The emphasis on metrics, such as the Impact Factor, has caused serious ethical problems in some journals. Apparently a few editors coerce authors into adding references citing their journals, thus manipulating their impact factors. The issue together with supporting facts has been brought to the attention of the IEEE leadership regarding several IEEE journals; this ethics issue goes, of course, much beyond IEEE and affects every publisher. At TAC we have never done such manipulation and we never will. We have built our high reputation in the field, which is also reflected in our high value metrics, over half a century of hard work. We are proud of what we have accomplished, and I assure you that we apply the highest ethical standards in our journal and this also involves processes to handle papers submitted by TAC editors, handling of protest cases, selecting new editors, and selecting reviewers.

TAC Annual Index: The index of TAC articles in a given year with respect to authors and to subjects may be found on Xplore in the December issues of TAC. The complete TAC index from 1997 to present may be found at the TAC website.

CSS Publications Digest: Since January 2012, the TAC Editorial Office has been compiling a monthly Publications Digest for CSS. This includes the table of contents of the CSS publications with direct links to IEEEExplore. This allows the reader to access the abstracts of the papers and decide which papers are of interest. You may access the Digest page using: <http://www.ieeeccs.org/publications-content-digest>.

New CSS Journal: A journal titled IEEE TRANSACTIONS ON CONTROL OF NETWORK SYSTEMS (TCNS) was launched by CSS and will commence publication in 2014. It is expected that some of the papers on networks submitted to TAC will be submitted to TCNS instead.

In Context: Sometimes it is difficult to appreciate one's results when they are not in someone's immediate areas of interest.

So it is important to put the results, introduced in a submitted paper, in context, so to be better understood and appreciated. For this, the authors are being asked to make sure that a paragraph is included in the introduction describing clearly and in some detail the connection of the topic dealt with within the paper to Systems and Control problems. If the study was motivated by an application, this should be mentioned. If the motivation is to extend previous mathematical results, this fact needs to be stated. In that context, it should be explained why the results are of importance.

II. SOME THOUGHTS ABOUT PUBLISHING RESULTS IN OUR FIELD

There are great practical needs in Control that are being addressed, but unfortunately not necessarily by using the latest theoretical developments. The reason is that many papers that report theoretical results are written to be appreciated primarily by the experts in that particular area, and they are typically difficult to understand and inaccessible by other readers and practitioners.

I understand that it is not easy to write articles that meet the high academic standards necessary for acceptance in TAC, while at the same time being written so they are accessible by a wider readership, and accomplishing all these requirements in the few number of pages we allow. Having said that, I believe we can do a better job in making our results more accessible, in convincing people of their importance and encouraging them to use them.

I have tried to encourage authors to do exactly that by requiring that their contributions be put in context - see above. It is much easier for the reader who is not an expert in that particular area to understand and appreciate the importance and usefulness of the results by connecting to a class of applications. This is most important because our field is very, very broad, both in the types of problems addressed and the approaches used. The mathematical tools used vary widely, from ODEs and PDEs, to automata and Petri nets, to logic, to optimization algorithms in continuous and discrete-time settings. So if the reader does not completely understand the mathematics we have to make an extra effort to explain the significance and implications of our theoretical contributions.

One way to encourage others to use our results, whenever possible, is to go beyond our theoretical contributions and start addressing the next step, that of implementation. We should, whenever possible, suggest algorithms, and offer software code so potential users can easily try out the results. I assume that we all want our results to be used. I do not assume that all of our results offer the opportunity to give rise to algorithms, but some certainly can and should.

And now here is a more difficult task. We need to address bigger problems. A system typically is more than a set of ODEs and the specs may not be conveniently described in the frequency domain. While these specs served us well in the past and are still very useful, we need to move on because the problems and their descriptions have become much more sophisticated and much more demanding. We are in the systems area after all, an area that prides itself for considering a wider view of the problem, taking a system's, a bird's eye point of view.

In hybrid dynamical systems we combine discrete and continuous dynamics to study the system behavior. Nowadays we have data, and lots of it, that need to be considered together with our mathematical models. What is the best way to go? This is quite a challenge.

In my current research I study Cyber-Physical Systems (CPS) that combine cyber, physical dynamics, networks and perhaps human operators. Because of demanding specifications, tight interactions between cyber and physical dynamics need to be designed and explored. We typically do not have exact models because during its life cycle the CPS may expand and contract. In my group, we have been using energy-like concepts of passivity and dissipativity in new ways to characterize CPS and we hope to derive a methodology to design safe CPS. So here is a very general framework, where we use extensions of classical control concepts to address the problems. We also have developed ways to experimentally determine passivity indices; we have also worked on algorithms and written software so interested parties can easily and conveniently try out our results.

III. SOME CLOSING THOUGHTS

At our editorial office we receive a steady stream of excellent papers in the very broad area of Systems and Control and we apply high reviewing standards to make them even better. We are doing well; we publish a large number of excellent papers containing significant results. But perhaps we should also gaze down the road to see what happens next.

Perhaps we do not go far enough in our pursuit of solutions. Maybe we stop too soon. Or maybe we are not thinking big enough. Are we letting others think for us and take ownership of problems? Are we leaders in technology? Can we perhaps do better? Our formulations do not address the whole problem. We address parts of the problem, typically the part that is described by ODEs. And in the part we are addressing, we typically stop short of designing algorithms let alone implementing algorithms in software. So this is something to think about if we want to have a vibrant, relevant, and influential research community.

PANOS ANTSAKLIS, *Editor-in-Chief*
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Panos Antsaklis (F'91) is a graduate of the National Technical University of Athens, Greece, and received the M.S. and Ph.D. degrees from Brown University, Providence, RI.

He is the Brosey Professor of Electrical Engineering at the University of Notre Dame. He had co-authored two research monographs on discrete event systems, two graduate textbooks on linear systems and has co-edited six books on intelligent autonomous control, hybrid systems and networked embedded control systems. His research addresses problems of control and automation and examines ways to design control systems that will exhibit high degree of autonomy. His recent research focuses on Cyber-Physical Systems and addresses problems in the interdisciplinary research area of control, computing and communication networks, and on hybrid and discrete event dynamical systems.

Dr. Antsaklis is a Fellow of the IFAC and AAAS. He received the Engineering Alumni Medal of Brown University in 2006 and a 2012 honorary doctorate recipient from the University of Lorraine, France, in 2012. He is the Editor-in-Chief of the IEEE TRANSACTIONS ON AUTOMATIC CONTROL.